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May 23, 2023

File: W2020L2-0004

Harry O'Keefe
Arctic Canadian Diamond Company Ltd.
900-606 4 Street SW
Calgary, AB T2P 1T1

Sent by email

Dear Harry,

Re: Ekati – AEMP Re-evaluation 2022, AEMP Design Plan Version 8.0, and Point Lake AEMP Design Plan V 1.0 – Approved with Revisions Required - Lac de Gras, NT

The Wek'èezhì Land and Water Board met on May 18, 2023 and considered the 2022 Aquatic Effects Monitoring Program (AEMP) Re-evaluation Report (including Version 8.0 of the AEMP Design Plan)¹ and Point Lake AEMP Design Plan V 1.0,² submitted by Arctic Canadian Diamond Mine Ltd.'s (Arctic) on December 15 and November 14, 2022, respectively, as required by Water Licence (Licence) W2020L2-0004.

The Board has approved Version 8.0 of the AEMP Design Plan and Version 1.0 of the Point Lake AEMP Design Plan, and requires that Arctic revise the AEMP Design Plan as detailed in the Board's Reasons for Decision (attached).

Within 90 days of communication of this decision, Arctic must submit Version 8.1 of the AEMP Design Plan to the Board, addressing the items detailed in the Board's Reasons for Decision. These submissions should be prepared in accordance with the Land and Water Boards' *Document Submission Standards*.³

Please direct questions or concerns regarding this letter to Ryan Fequet in writing.

¹ See WLWB Online Registry for [Ekati – AEMP Re-evaluation 2022 – Report and Cover Letter – Dec 15 22](#); [Ekati – AEMP Re-evaluation 2022 – Appendices – Dec 15 22](#)

² See WLWB Online Registry for [Ekati – AEMP – Point Lake AEMP Design Plan – V 1.0 – Nov 14 22](#).

³ See WWB Policies and Guidelines webpage for MVLWB [Document Submission Standards](#).

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Mason Mantla', written in a cursive style.

Mason Mantla
Chair, Wek'èezhìi Land and Water Board

BCC'd to: Ekati Distribution List
Jamie Steele – Inspector, GNWT-ECC

Attached: Reasons for Decision



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Reasons for Decision

Reference/File Number:	W2020L2-0004 (Type "A" Water Licence)
Licensee:	Arctic Canadian Diamond Company Ltd. (Arctic)
Subject:	2022 AEMP Re-evaluation Version 8.0 AEMP Design Plan Version 1.0 Point Lake AEMP Design Plan

Decision from the Wek'èezhìi Land and Water Board Meeting of May 18, 2023

1.0 Decision

On May 18, 2023, the Wek'èezhìi Land and Water Board (WLWB or Board) met and considered the 2022 Aquatic Effects Monitoring Program (AEMP) Re-evaluation Report (including Version 8.0 of the AEMP Design Plan)⁴ and Point Lake AEMP Design Plan V 1.0,⁵ submitted by Arctic Canadian Diamond Company Ltd. (Arctic) to the Board on December 15 and November 14, 2022, respectively. After reviewing the Report and Plans and the evidence gathered during the regulatory proceeding, the Board has made the following decisions:

1. To approve the 2022 AEMP Re-evaluation Report and the AEMP Design Plan Version 8.0;
2. To require Arctic to submit Version 8.1 of the AEMP Design Plan within 90 days of communication of this decision, including Revisions 1 through 4, and to reflect Directions 3, 4, 6, and 8;
3. Not to approve the removal of zinc as an evaluated variable for water quality in 2023-2025;
4. Not to approve the removal of zinc as an evaluated variable for sediment in 2023-2025;
5. To require Arctic to discuss the results of uranium concentrations in sediment for Cujo Lake (and any potential new related results from 2023 sediment sampling) in the 2023 AEMP Annual

⁴ See WLWB Online Registry for [Ekati – AEMP Re-evaluation 2022 – Report and Cover Letter – Dec 15 22](#); [Ekati – AEMP Re-evaluation 2022 – Appendices – Dec 15 22](#)

⁵ See WLWB Online Registry for [Ekati – AEMP – Point Lake AEMP Design Plan – V 1.0 – Nov 14 22](#).

Report in relation to a 100 mg/kg benchmark. Arctic is to discuss any implications for having a benchmark set too high or too low;

6. To require Arctic to include non-lethal Slimy Sculpin sampling in all AEMP lake sites in 2023 and 2025 for CPUE, in addition to the planned small-body fish sampling in 2024;
7. To approve the Point Lake AEMP Design Plan Version 1.0; and
8. To require Arctic to incorporate the Point Lake AEMP Design Plan into Version 8.1 of the AEMP Design Plan.

2.0 Background

The Aquatic Effects Monitoring Program (AEMP) represents an extensive monitoring program, which includes the monitoring of water, sediment, and several types of living organisms around the Ekati site. The purpose of the AEMP is to measure and evaluate potential effects of the mine on the Receiving Environment. The AEMP Design Plan outlines the details for the sampling program (e.g., sampling locations, field and laboratory methods, and data analysis methods) and the AEMP Annual Reports present the results from the previous year of monitoring. Currently, Ekati has two approved AEMP Design Plans: the main site AEMP Design that addresses monitoring in the Koala, King-Cujo, Pigeon-Fay and Upper Exeter, and Carrie Pond Watersheds; and the Sable AEMP that addresses monitoring in the Horseshoe Watershed and Lower Exeter Lake.

Part J, Condition 4 of Water Licence W2020L2-0004 (the Licence) requires Arctic to submit a revised AEMP Design Plan every three years. Part J, Condition 5 of the Licence requires the submission of an Aquatic Effects Re-evaluation Report every three years, which is meant to evaluate the overall effectiveness of the AEMP by providing a comprehensive interpretation and discussion of the data collected since Project inception with the goal of describing the Project-related effects on the Receiving Environment, updating predictions of Project-related effects on the Receiving Environment, and providing supporting evidence for proposed revisions to the AEMP Design Plan. As per Part J, Condition 7 of the Licence, the AEMP Design includes a Response Framework.

Part J Condition 2 (c) was included during the Point Lake Amendment proceeding; this condition requires submission of an updated AEMP Design Plan to include the Point Lake Project.

Version 1 of the Point Lake AEMP Design Plan was submitted on November 14, 2022.⁶ Arctic's 2022 AEMP Re-evaluation Report (the AEMP Re-evaluation) and AEMP Design Plan Version 8.0 were submitted on December 15, 2022.⁷ The submissions were distributed together for public review on January 17, 2022, using the Online Review System (ORS). They were distributed together to reflect the Board's intent for an aligned review, as discussed in the April 8, 2022 Reasons for Decision.⁸ Comments and recommendations were received by the deadline of February 28, 2023 from the Independent Environmental Monitoring

⁶ See WLWB Online Registry for [Ekati – AEMP – Point Lake AEMP Design Plan – V 1.0 – Nov 14 22](#)

⁷ See WLWB Online Registry for [Ekati – AEMP Re-evaluation 2022 – Report and Cover Letter – Dec 15 22](#); [Ekati – AEMP Re-evaluation 2022 – Appendices – Dec 15 22](#)

⁸ See WLWB Online Registry for [Ekati – Point Lake Project – RFD and Recommendation to Minister – Apr 08 22](#)

Agency (IEMA), the Government of the Northwest Territories – Department of Environmental and Natural Resources (GNWT-ENR; now known as GNWT-Environment and Climate Change Canada, GNWT-ECC), Fisheries and Oceans Canada (DFO), and Environment and Climate Change Canada (ECCC); Board staff also submitted questions. Proponent responses were submitted by the extended deadline of April 7, 2023. The review summary is available on the WLWB Online Review System.⁹

3.0 Reasons for Decision

The AEMP Re-evaluation was reviewed for conformity to Part J, Condition 5 and Schedule 8, Condition 2 of the Licence, as well as Board direction from the 2021 AEMP Annual Report. All reviewer comments and proponent responses submitted during the public review were also reviewed.

The AEMP Re-evaluation is based on an analysis of results from the main Ekati AEMP. The AEMP Re-evaluation includes 10 recommendations related to the AEMP, including proposed changes to the 2023-2025 AEMP Design Plan (including moving the Logan Outflow hydrometric monitoring station, exclusion of non-benthic taxa from the lake and stream benthos datasets, and removal of zinc from the list of AEMP evaluated water quality variables for Horseshoe Watershed and Lower Exeter Lake) and recommendations for the next AEMP Re-evaluation. These 10 recommendations, along with supporting rationale, are presented throughout the Re-evaluation and summarized in Section 6.3 of the Re-evaluation Report. Arctic also had six recommendations for the Response Framework, which were presented in Appendix A of the Report. For this Reasons for Decision, Arctic's recommendations have been summarized in Tables 1 and 2, along with the Board's decision on each of Arctic's recommendations. These Tables have been provided at the back of the document

The Board has approved the 2022 AEMP Re-evaluation Report. With respect to the recommendations made by Arctic for Version 8.0 of the AEMP Design Plan and the next AEMP Re-evaluation, the Board made decisions in Tables 1 and 2 to reflect the outcome of the public review, as well as consideration of previous Board directives and reviewers' comments. Below is a summary of the main topics that were brought up during the public review, as well as a summary of some of the main changes proposed for the AEMP Program. Overall Arctic is not recommending significant changes to the AEMP Design Plan or Response Framework at this time, and the Board is of the opinion that issues raised during the review can be resolved as discussed below. Therefore, the Board has approved the submissions, with revisions and directions as outlined in this Reasons for Decision.

- ***Decision #1: The Board has approved the 2022 AEMP Re-evaluation Report and the AEMP Design Plan Version 8.0.***
- ***Decision #2: Arctic is to submit Version 8.1 of the AEMP Design Plan within 90 days of communication of this decision, including Revisions 1 through 4, and to reflect Decisions 3, 4, 6, and 8.***

⁹ See WLWB Online Review System for the [2022 AEMP Re-evaluation and Point Lake AEMP Design Plan Item for Review](#)

3.1 AEMP Re-evaluation Report and AEMP Design Plan Version 8.0

As discussed above, the Board has approved the AEMP Design Plan Version 8.0 but some revisions are required as outlined below.

3.1.1 Water Quality

Removal of Zinc from the List of Evaluated Variables

The water quality monitoring program for the Ekati AEMP includes the analysis of 47 water quality variables (i.e., monitored variables). Analytical results (i.e., concentrations) for these variables are presented annually through the AEMP Annual Report, whereas a subset is selected for statistical evaluation (i.e., evaluated variables). In each Three-Year Re-evaluation Report, Arctic can make recommendations regarding which variables should be evaluated for the next three-year period; this can include adding or removing variables. The only variable proposed to be removed from the list of evaluated variables for the 2023-2025 AEMP was zinc in the Horseshoe Watershed and Lower Exeter Lake. Arctic's rationale for the removal is that there is no increasing trend in the watershed, and no predicted increase during the 2023-2025 time frame (see Arctic Recommendation 6 in Table 1). The Two Rock Sedimentation Pond has a Discharge point to the Horseshoe Watershed. Discharge from the Two Rock Settling Pond (TRSP) has only recently commenced and the discharge rate is expected to increase in 2023. As such, ECCC noted that further monitoring to confirm plume delineation for the discharge is required (ECCC comment 2). ECCC also noted that there is an effluent quality criterion (EQC) for zinc for the discharge from TRSP to Horseshoe Lake. Given the uncertainty regarding discharge volume and water quality concentrations, ECCC recommended zinc be retained as an evaluated variable for water quality. Arctic responded that total zinc would continue to be monitored as a part of the AEMP, but that up-to-date modelling studies found that zinc was no longer a variable of interest downstream of the TRSP. Arctic further noted no increasing trends had been observed in the AEMP to date. The same rationale has been used for removal of variables in previous AEMP Re-evaluations. Arctic indicated total zinc was retained in the Response Framework, which has action levels in place in the event of elevated zinc concentrations, and different management actions would be addressed in a resulting Response Plan. While the Board agrees that the current model results may demonstrate that zinc is no longer a "variable of interest", as noted by ECCC: further modelling updates and a change in discharge rate are expected in 2023 (as per the April 28, 2023 Reasons for Decision¹⁰); there is an EQC for zinc for the discharge from TRSP; and the discharge from the TRSP only recently commenced. In previous AEMP Re-evaluations, when variables were removed based on the same rationale (e.g. 2015 AEMP Re-evaluation), it was based on a more extensive dataset.¹¹ As such, it may be valuable to maintain zinc in the list of evaluated variables for 2023-2025, and the issue can be revisited in the next AEMP Re-evaluation. The Board has decided that zinc be maintained as an evaluated variable in the 2023-2025 AEMP Design Plan.

¹⁰ See WLWB Online Registry for [Ekati – Two Rock Outfall Report Version 3.1 Plume Delineation Report Version 1 – Reasons for Decision – Apr 28 23](#)

¹¹ See WLWB Online Registry for [W2012L2-0001 – Ekati – 2015 AEMP Re-evaluation and Proposed Design – Board Directive and RFD – Feb 27 17](#)

- **Decision #3: The Board has not approved the removal of zinc as an evaluated variable for water quality in 2023-2025. This decision is to be reflected in Version 8.1 of the AEMP Design Plan .**

Water Quality Benchmark Guidance

ECCC commented on the water quality benchmarks used for analysis of water quality; specifically, ECCC noted that some of the benchmarks are based on outdated guidelines and that it had previously recommended that benchmarks be updated to reflect current guidelines (in particular the Federal Environmental Quality Guidelines (FEQG); ECCC comment 5). ECCC reiterated its position that the benchmarks be updated to reflect current guidelines. ECCC indicated that Arctic’s previous response was that existing approved benchmarks are already in place, and as modelling does not predict increasing trends, the guidelines do not require updates. ECCC noted it was good scientific practice to incorporate updates to monitoring based on recent and more relevant science, and the FEQGs were developed to support monitoring on substances for which Canadian Council of Ministers of the Environment (CCME) guidelines do not yet exist, or “are not reasonably expected to be updated in the future” (ECCC comment 5). Arctic responded that, according to CCME, CCME Guidelines are “intended to protect all forms of aquatic life and all aspects of aquatic life cycles, including the most sensitive...”. Arctic noted that ECCC had not provided any information that indicates CCME guidelines are not protective of aquatic life. The Board notes that this discussion is currently ongoing as part of the Renewal Proceeding for W2022L2-0001 (currently W2020L2-0004), and Arctic recently provided an Information Request (IR) response outlining how various FEQGs may have implications for the Project.¹² Any potential decisions regarding this recommendation are better addressed as part of the Proceeding as it is still ongoing. Should it be determined that updates to the guidelines be needed, a revision to the AEMP Design Plan could be considered at that time.

3.1.2 Sediment Quality

Removal of Zinc from the List of Evaluated Variables

The sediment quality monitoring program for the Ekati AEMP includes the analysis of 32 sediment quality variables (i.e., monitored variables). These variables are monitored every three years with analytical results presented in the AEMP Annual Report. Similar to water quality variables, a subset is selected for statistical evaluation (i.e., evaluated variables) and this list is revisited as part of each Three-Year Re-evaluation Report. As for water quality, Arctic recommended that zinc be removed as an evaluated variable for sediment quality (see Arctic Recommendation 8 in Table 1). ECCC comment 2 recommended retaining zinc as an evaluated variable in sediment quality as well, using the same rationale as discussed above in section 3.1.1 of this Reasons for Decision. For the same reasons discussed above, the Board has decided that zinc be retained as an evaluated variable in sediment quality for the 2023-2025 AEMP.

- **Decision #4: The Board has not approved the removal of zinc as an evaluated variable for sediment in 2023-2025. This is to be reflected in Version 8.1 of the AEMP Design Plan.**

¹² See WLWB Online Registry for [Ekati – Renewal – Technical Session – IR Responses – Arctic – Apr 13 23](#)

Sediment Sampling Field Methods

The 2020-2022 Design Plan was previously updated to reflect a change in the sediment sampling method, as per the Board's decision on the Sediment Sampling Method Study, to allow the use of an Ekman-core hybrid sampling method (i.e., Ek-core).¹³ In review of the AEMP Re-evaluation Report, GNWT noted that the 2023-2025 AEMP Design Plan indicates sampling for particle size distribution is completed using a standard Ekman sampler, and that due to the quantity of sediment needed for particle size distribution, the top 2 cm of sediment from the Ekman sample is used for the analysis (GNWT-ENR comment 4). There is also a note in the Plan indicating that nutrients and organic carbon analyses may be completed using this same top 2 cm of sediment if insufficient material is available in the Ek-core samples. GNWT commented that nutrients should not be sampled using material collected by Ekman dredge methods alone, and that if insufficient sediment is available in the Ek-corer samples, additional samples should be collected until sufficient material was acquired (GNWT comment 4). Arctic responded that the Board had previously directed in 2017 that 1 cm core samples be used instead of 2 cm Ekman grabs for monitoring of metals and nutrients, but that the Ekman sampler could be used if necessary for monitoring particle size and associated nutrients.¹⁴ Arctic noted that the Board approved the use of an Ek-core hybrid sampling method in 2021 for sampling the top 1 cm of sediment for AEMP sampling.¹⁵ Arctic also noted that previous decisions had allowed for the use of the Ekman sampler for nutrient analyses where necessary. Arctic explained that almost double the currently collected sample and double the sampling effort would be needed to obtain the required sample quantity for nitrogen analysis. Arctic stated the current sediment sampling method and analysis prioritization allows for reliable and consistent data collection.

Based on Arctic's rationale regarding the additional effort to collect sufficient Ek-core samples, and that the Board has previously decided the Ekman could be used for particle size and associated nutrients, the Board is of the view that the proposed sediment sampling protocol in Version 8 of the AEMP Design Plan is reasonable and are not requiring changes at this time.

Uranium in Sediments

GNWT-ENR observed that the sediment uranium concentration in Cujo Lake was 19.7 mg/kg in 2021, a four-fold increase since sampling began in 2011. A mine-related effect was identified for uranium in Cujo Lake sediments, and in the absence of a benchmark value, Arctic performed a literature review to assess the likelihood of toxicity to aquatic life. From the review, Arctic concluded whole sediment concentrations less than 599 mg/kg were not expected to cause adverse effects. GNWT-ENR asserted that this is not consistent with the most recent literature on the subject (GNWT-ENR comment 6).

¹³ See WLWB Online Registry for [W2012L2-0001 – Ekati – AEMP – Sediment Sampling Method Study – Reasons for Decision – Jun 22 21](#)

¹⁴ See WLWB Online Registry for [W2012L2-0001 – Ekati – AEMP – 2015 Aquatic Effects Monitoring Program Re-evaluation and Proposed Design – Board Directive and RFD – Feb 27 17](#)

¹⁵ See WLWB Online Registry for [W2012L2-0001 – Ekati – Sediment Sampling Method Study – Reasons for Decision – Jun 22 21](#)

GNWT-ENR noted that in its previous review of the 2021 AEMP Annual Report, it had referenced a paper from Thompson et al. (2005) that found lowest effect level concentrations for uranium at 32 and 104.4 mg/kg, based on two different methods. GNWT-ENR had also highlighted results from Goulet and Thompson (2018) that found median lethal concentrations for juvenile and adult *Hyalella azteca* were 48 and 214 mg/kg, respectively (limitations of this study were acknowledged by GNWT and Arctic). GNWT-ENR also commented that Simon et al. (2022) had derived a “quality” standard of 4 mg/kg, using an assessment factor as an expression of uncertainty. In response, Arctic had criticized Simon et al.’s results based on its use of artificial sediments and the selection of assessment factors.

In review of the 2022 AEMP Re-evaluation Report, GNWT-ENR noted that if assessment factors were ignored, the resulting No Observed Effect Concentration (NOEC) and EC10 values were two to 15 times lower than the benchmark proposed by Arctic.¹⁶ GNWT-ENR noted there is a range of literature-published concentrations on uranium, which highlights large uncertainties. GNWT-ENR recommended the uranium in sediment benchmark be based on the most recent research available, and that Arctic set the AEMP benchmark at 100 mg/kg to align with the recommendation from Sheppard et al. (2005), who recommended a Predicted No Effect Concentration (PNEC) of 100 mg/kg dry mass. Arctic maintained that the 599 mg/kg benchmark is appropriate as it is the lowest NOEC found under realistic sediment conditions.

The Board acknowledges that there is a wide range of suggested benchmarks from the literature, with a lack of guidelines available. Sediment sampling occurs on a three-year cycle, and the 2021 sampling was a delay from 2020; therefore, the next sediment sampling will occur in 2023. Sediment variables are not a current component of the Response Framework, as discussed in the Reasons for Decision for the 2019 AEMP Re-evaluation.¹⁷ As such, while having a relative threshold for comparison of uranium concentrations in sediment may be useful at this time for understanding potential risk of impacts, it isn’t clear if GNWT-ENR intended for this value to be reflected in the AEMP Design Plan and Response Framework. As uranium in sediment is not currently a component of the Response Framework, the Board is of the view that it would be more conservative and precautionary to consider results in comparison to the lower proposed benchmark. As identified, the next sediment sampling event is in the summer of 2023; therefore, the Board requires Arctic to discuss the results of the uranium concentrations in sediment for Cujo Lake in the 2023 AEMP Annual Report in relation to the 100 mg/kg benchmark proposed by GNWT-ENR. Arctic is to discuss any implications for having a benchmark set too high or too low.

- ***Decision #5: Arctic is to discuss the results of uranium concentrations in sediment for Cujo Lake (and any potential new related results from 2023 sediment sampling) in the 2023 AEMP Annual Report in relation to a 100 mg/kg benchmark. Arctic is to discuss any implications for having a benchmark set too high or too low.***

¹⁶ NOEC (No Observed Effect Concentration) is the highest tested concentration for which there is no statistical significant difference of effect ($p < 0.05$) when compared to the control group in long-term ecotoxicity studies. EC10 is the concentration at which 10% of the organisms tested exhibit a statistically significant effect from a parameter.

¹⁷ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - 2019 AEMP Re-eval and Design Plan V. 7 and Fish RP V2 - Reasons for Decision - Mar 24 21.pdf](#)

3.1.3 Lake and Stream Plankton and Benthos

Phytoplankton Taxonomy

GNWT-ENR commented that the phytoplankton community composition data is based on a limited taxonomic resolution and that the multivariate analysis comparing phytoplankton community composition and water quality has been performed on even broader phytoplankton groups (GNWT-ENR comment 2). GNWT-ENR noted that lumping phytoplankton taxa into broad categories weakens the dataset further and recommended that the finest taxonomic resolution possible should be used in the analysis as different species have different optimal conditions and tolerances to different water chemistry (GNWT-ENR comment 2). Arctic responded that it is necessary to group phytoplankton taxa into broader categories as there has been inconsistent taxonomic resolution through the years. Arctic argued that using a finer scale taxonomic resolution in the data would introduce unnecessary bias that would “obscure and override any real environmental patterns.” Arctic referenced a number of papers that indicate grouping at a higher taxonomic resolution is justifiable and often required when attempting to determine patterns in the ecological function of the community over longer time scales. Arctic’s rationale in response to GWT-ENR appears reasonable to the Board.

Non-benthic Taxa in Benthos Analysis

One of Arctic’s recommendations was to remove non-benthic taxa from the analysis of benthos, which had been mistakenly included historically. In its review, IEMA noted that some species of copepods (i.e., a type of zooplankton) are adapted to living at the bottom of lakes (IEMA comment 3). IEMA asked for Arctic to clarify which invertebrate taxa were being recommended for removal from benthic or bottom-dwelling taxa, and to confirm that any species of bottom-dwelling copepods would not be discarded from the data set. In response, Arctic provided an amended list of the non-benthic taxa that would be excluded in future AEMPs. With respect to the species of bottom-dwelling copepods, Arctic noted that the samples are not identified beyond order, and specific taxa (i.e., bottom-dwelling copepods) could not be consistently categorized as benthic, and as such the entire Order needed to be excluded. This rationale appears reasonable to the Board.

In its comment, IEMA also noted a taxonomic reference error. Specifically, IEMA noted that Arctic indicated that harpacticoid copepods are a type of cladoceran (i.e., a zooplankton from the order Cladocera) whereas harpacticoid copepods (i.e., Harpacticoida) are an order of copepods (IEMA comment 3). In its response, Arctic agreed with IEMA that there had been an error in one of the referenced orders (Harpacticoida).

As Arctic has provided a revised list of non-benthic taxa to be excluded from the benthos dataset and concurred that there is an error in the reference to Harpacticoids, the Board is of the opinion that these changes should be included in an updated AEMP Design Plan.

- ***Revision #1: Arctic is to: a) update the list of non-benthic taxa to be excluded from analysis of benthic samples in Version 8.1 of the 2023-2025 AEMP Design Plan; and b) correct the taxonomic reference for harpacticoids.***

Metal Analysis of Zooplankton and Benthic Invertebrates

Zooplankton and benthic invertebrates (or benthos) were selected for sampling in the AEMP and as part of the Response Framework because they are a food resource for fish, and changes in community composition of zooplankton and/or benthos could indicate ecologically important changes in this food resource. In its review, IEMA commented on the importance of these indicators for monitoring potential risks to fish; specifically, the importance of zooplankton to Lake Trout (and other pelagic species) and the importance of benthic invertebrates to Slimy Sculpin (IEMA comments 2 and 4). IEMA recommended that metal analysis of zooplankton samples and benthos samples be conducted to: a) help identify potential risk to Lake Trout and Slimy Sculpin; and b) more clearly determine whether potential mine-related effects that move through the food chain exist (IEMA comments 2 and 4). IEMA noted that large-bodied fish sampling had not yet occurred at the Horseshoe Watershed, and that while it agreed that there was not sufficient evidence for that sampling to occur, Slimy Sculpin were not an ideal surrogate for Lake Trout, and proposed zooplankton metal analysis as an alternative. IEMA expanded this recommendation to all watersheds to identify potential risks to fish (IEMA comment 2). IEMA further observed that while no mine-related effects or potential mine-related effects were detected for lake or stream benthos for the Koala Watershed or Lac de Gras in 2021, this did not acknowledge that “metal concentrations in benthic organisms are not analyzed.” IEMA commented that this was important as selenium concentrations are “increasing in sediment (where benthic organisms feed) and in Slimy Sculpin (who feed on benthic organisms) in the Koala watershed”, which suggests a possible link between sediment metal concentrations and benthic organisms which hasn’t been examined.

Arctic responded that the same rationale for why large-bodied fish sampling in the Horseshoe Watershed is not warranted applies to why metals analysis in zooplankton is not warranted. Arctic stated that the AEMP results thus far have demonstrated no changes in the receiving environment that indicate the possibility that metals may be absorbed or accumulated by plankton at this time. More specifically, section 4.4.2 of the AEMP Re-evaluation notes that Arctic has not found any mine-related changes in water quality, sediment quality, plankton, benthos, or Slimy Sculpin downstream of the TRSP. Arctic also pointed out that starting metals analysis in zooplankton and benthos at this time would not provide information of value (i.e., help to explain potential mine-related changes) as there is no baseline information to compare against. Therefore, any conclusions would be largely speculative. Arctic noted there was no rationale provided for why direct monitoring of water quality was not the best approach and that the Response Framework was a more suitable approach as it includes action levels related to the benchmarks with which to respond to changes observed in the environment (response to IEMA comment 2).

The Board agrees with Arctic that it is unclear how metal analysis of zooplankton and/or benthos samples would provide better information with respect to detecting mine-related changes in the Receiving Environment. As there is no baseline data available for those specific parameters, the Board is of the opinion that the current AEMP Design Plan and Response Framework are sufficient for informing IEMA’s questions regarding potential risks to Lake Trout, Slimy Sculpin, and potential mine-related effects through the food chain. Should changes in the receiving environment be observed and/or Action Levels

triggered, a more in-depth study of metals in zooplankton and/or benthos could be considered as a potential study as part of the Response Plan.

Benchmark for chlorophyll *a*

In the 2021 AEMP Annual Report Reasons for Decision, Arctic was directed to include a discussion of the appropriateness of the chlorophyll *a* benchmark in relation to 2021 benchmark exceedances, and propose if the benchmark was appropriate, with rationale, in the 2022 AEMP Re-evaluation.¹⁸ Arctic included this discussion in Appendix A, and outlined that the benchmark was appropriate as it was “conservative, based on empirical evidence, and incorporates the natural variability in phytoplankton abundance in AEMP lakes.” Arctic highlighted that a range of acceptable chlorophyll *a* concentrations is determined using modelled distributions and the probability of observations occurring in the lower and upper extremes of these modelled distributions. Arctic noted the benchmark is expected to be exceeded due to natural variability in 5% of samples. Arctic discussed how the benchmark is an early warning signal, rather than a threshold for determining effects, or a threshold at which adverse effects could occur. The biological benchmarks were updated to incorporate more recent reference data and baseline data from sites associated with new developments at Ekati, which was reflected in the proposed 2023-2025 AEMP Design Plan. Based on Arctic’s rationale, the Board has no further comments at this time regarding the benchmark. No comments were received regarding Arctic’s rationale during review of the Report.

3.1.4 Fish

Slimy Sculpin CPUE

GNWT and DFO commented on the reported decline in catch per unit effort (CPUE) of Slimy Sculpin in all monitored lakes between 2007 and 2021, and both recommended a form of accelerated or expanded non-lethal program (GNWT comment 5; DFO comment 1). GNWT-ENR recommended that Arctic: include an accelerated sampling schedule for small-bodied fish; include sampling in 2022 or 2023 to inform the declining trend; and have annual non-lethal sampling. DFO noted that it supported GNWT’s recommendation. In review of the 2021 AEMP Annual Report, GNWT-ENR had also recommended that Arctic include an accelerated sampling schedule for small-bodied fish. In the Reasons for Decision for the 2021 AEMP Annual Report, the Board directed Arctic to include a discussion of Slimy Sculpin CPUE in the next AEMP Re-evaluation Report, including what data was required to understand CPUE trends, and what factors could be evaluated to determine if there are mine-related effects.¹⁹ In the AEMP Re-evaluation Report, Arctic noted that “additional monitoring years should aid in improving the understanding of such changes in an endpoint for which a great deal of variation and uncertainty is present.” In response to GNWT-ENR and DFO’s comments, Arctic stated there was no benefit to adding additional intermittent years of non-lethal sampling for an investigation of CPUE natural variability in year-to-year numbers. Arctic noted that changes in Slimy Sculpin CPUE are not likely reliable indicators of potential population level effects as a small portion of the total population is captured compared to the potential population. Arctic further observed that there have been no changes in fish health indices that indicate mine related effects

¹⁸ See WLWB Online Registry for [Ekati – AEMP – 2021 Annual Report – Reasons for Decision – Jul 19 22](#)

¹⁹ See WLWB Online Registry for [Ekati – AEMP – 2021 Annual Report – Reasons for Decision – Jul 19 22](#)

on survivability or reproduction of Slimy Sculpin. Arctic's position is that "value placed in CPUE data for Slimy Sculpin should be carefully and somewhat limited." As noted by GNWT-ENR, Arctic has indicated that additional data is the only method by which the downward trends in Slimy Sculpin CPUE can be assessed, and as small-bodied fish sampling is the primary trigger for large-bodied fish sampling, it is important to understand changes in small-bodied fish species.

Further, in response to WLWB staff comment 3, Arctic noted it was challenging to estimate abundance of Slimy Sculpin in Arctic environments, but that from a referenced literature review, CPUE from electrofishing is the most effective method. In its comment, GNWT-ENR noted it was not clear what the mortality rate of electrofishing is as a part of the AEMP program, and that its experience suggested that small-bodied fish sampling mortality is generally low (less than 5%). Arctic did not provide a response on the suggested 5% mortality. Based on this information, the Board is of the opinion that electrofishing would be the most effective method for additional sampling, and based on GNWT-ENR's comment, effects on mortality are expected to be minimal.

The Board notes that Slimy Sculpin CPUE has been a measured parameter since 2007 and an evaluated variable since 2017. As Arctic has indicated that the mechanism for better understanding CPUE declines is additional monitoring years, and multiple parties are supportive of an expanded small-bodied fish sampling program, it seems reasonable to the Board that an expanded sampling program include non-lethal methods until the CPUE decline is better understood. Slimy Sculpin are intended to be a sentinel species for large-bodied fish, and as large-bodied fish are only sampled every six years, an expanded sampling program for Slimy Sculpin may help Arctic better understand any potential effects and/or identify the need to initiate earlier sampling/studies of large-bodied fish. The Board agrees with reviewers that this program should be non-lethal and only be implemented until sufficient data is collected. The Board requires Arctic to include additional non-lethal Slimy Sculpin sampling in AEMP lakes in 2023 and 2025, in addition to the currently planned sampling in 2024 that is to take place under the 2023-2025 AEMP Design Plan.

- ***Decision #6: Arctic is to include non-lethal Slimy Sculpin sampling in all AEMP lake sites in 2023 and 2025 for CPUE, in addition to the planned small-body fish sampling in 2024. This should be reflected in the submitted revised Design Plan.***

3.1.5 Statistical Analysis

Principal Component Analysis Methods

The statistical analysis for the AEMP uses Principal Component Analysis (PCA), which is used to understand patterns in water quality data and is used to explain variation in the dataset. PCA is used to evaluate patterns amongst variables, and other statistical and/or graphical analysis is done with the larger dataset to also evaluate for effects in the environment. In order to focus on main parameters and reduce bias, water quality variables that have more than 20% of samples below detection limit (BDL) are not included in the analysis. IEMA noted that this leads to the exclusion of water quality variables such as chlorine and selenium, both of which have increased significantly in concentration due to mine activities (IEMA

comment 1). IEMA noted it was concerned that the exclusion of variables with 20% of samples BDL may result in important water quality variables not being included in the analysis, leading to inaccurate or incomplete conclusions. IEMA recommended Arctic provide justification and rationale for the use of the 20% BDL cutoff. Arctic responded that 44% of chloride values and 83% of selenium values were BDL, and are spread throughout years of data collected (i.e., there is no bias to earlier or later years). Arctic provided references that indicated substitution of values that are less than the detection limit are accepted when the proportion of data below the DL is small (e.g., less than 15%), but that if a large proportion of data is below DL, this can introduce bias. A 20% BDL cutoff was selected in order to not bias results and retain some “important variables”. The Board notes that the 2019 AEMP Re-evaluation used a 20% BDL cutoff as well.

In the 2015 Re-evaluation, Arctic noted that the 2012 AEMP Re-evaluation method would replace observations below DL with zero or with 1/3 the DL. The 2015 Re-evaluation used varied data exclusions for variables with sample results below DLs; generally, if variables had >35% of observed values below DL, they were excluded. In the 2019 AEMP Re-evaluation, Arctic noted that variables with more than 20% of observed values less than the DL were excluded from the PCAs, except for the PCA on fish tissue data, which was relaxed to 30%. Arctic’s rationale was that previous sensitivity analyses on water and sediment quality data, and examination of the proportion of values below the DL, led to the 20% selection, as it did not bias results and allowed some important variables to be retained. At this time, it is unclear if and how the results and interpretation of the PCA analyses would be improved should a higher BDL cut-off be used; thus, the Board is not requiring a change at this time. The Board also notes that there are other AEMP evaluation methods for assessing effects related to variables that might be excluded from the PCA.

IEMA also identified a small error in Table 3.2-1 of the Report, which shows the water quality variables rejected for PCA as being those with less than (<) 20% of samples measured BDL, and those rejected variables should be shown as greater than (>) 20% BDL (IEMA comment 1). Arctic responded that it was an error in the table. The Board notes that this appears to be a small punctuation related error, which has not affected data interpretation or evaluation of effects. A revision to the Table does not seem necessary for the Report’s functionality.

3.1.6 Response Framework

Response Plan Exceedance Notifications

Part J, Condition 9 requires that if any Action Level defined in the approved Response Framework is exceeded, Arctic is to notify the Board within 60 days of when the exceedance is detected, and submit a response Plan within 90 days of when the exceedance is detected.

In the Report, Arctic recommended that if a Low Action level exceedance is not due to a mine-related effect, this would be identified in the Exceedance Notification to the Board and follow up evidence to support this would be submitted within 30 days. If the Low AL was determined to potentially be mine-related, a Response Plan would be developed or updated if necessary. Arctic’s supporting rationale was that Schedule 8, Condition 1(q) of the Licence (i.e., the Schedule that outlines the requirements of the

AEMP Design Plan) identifies that the AEMP Design Plan is to include “a description of a Response Framework that will link the results of the AEMP to those actions necessary to ensure that Project-related effects on the Receiving Environment remain within an acceptable range”. The Board interprets this response from Arctic to mean that it thinks that the Low Action Level Exceedances should only have an associated Response Plan if the exceedance is due to Project-related effects. The Board notes that the currently approved AEMP Design Plan indicates the overarching objective of the Response Framework is to “provide a tool for the protection of the uses of the aquatic Receiving Environment” and provides an “early warning system with defined Action levels that are initiated within an adequate timeframe to prevent the occurrence of significant adverse environmental effects.” Part J, Condition 9 requires a Notification for any exceedance of an Action Level, with further submission of a Response Plan within the prescribed time frame. Part J, Condition 9 does not include consideration of whether the exceedance is potentially mine-related.

Arctic was asked if it believed the proposed text for the Response Framework aligned with the current Licence and to describe why Arctic believed the proposed notification procedure was more effective than the current submission method (WLWB staff comment 1). Arctic responded that it believed the proposed text did align with the Licence as a notification of a Low AL exceedance would be provided within 60 days of detection of the exceedance. Arctic stated that “non-mine-related exceedances do not require response plans” and that the effectiveness of the approach was that it limited the likelihood of needing to produce a Response Plan for review and Board decision. Arctic acknowledged that the situations where the proposed text would apply are likely very limited, and if the Board determined this approach was not in line with the Licence, the change could be removed.

The Board is of the view that the proposed text does not align with the current Licence because Part J, Condition 9 does not specify different steps for a mine-related versus a non-mine related exceedance. Also, Schedule 8, Condition 4(c) requires that a Response Plan include a “description of likely causes of the Action Level exceedance and potential mitigation options if appropriate.” Should the cause be identified as not mine-related, Arctic could include rationale for why certain response actions or further steps are not needed as part of the Response Plan, which would be considered by the Board following a public review. From Arctic’s proposed text, Arctic would need to provide rationale to support whether a Low AL exceedance were not mine-related, which would potentially/likely also require a public review. It is thus unclear that this approach is more efficient or effective than the currently approved notification requirements. Furthermore, the Board notes that Arctic has the option to propose revisions to its Response Framework by which the Low AL would only be considered exceeded if it were linked to a mine-related effect. This condition already applies to Low ALs for biological variables. As such, the Board directs Arctic to remove the proposed text from the Response Framework.

- ***Revision #2: Arctic is to remove the proposed text in Arctic’s AEMP Recommendation 4 in submission of Version 8.1 of the AEMP Design Plan.***

3.2 Point Lake AEMP Design Plan

The Point Lake AEMP Design Plan V 1.0 was submitted under Part J, Condition 2(c) of the Licence. This requirement was included in the Licence as part of the Amendment proceeding for the Point Lake Project. The Board had intended for an aligned review of the Point Lake AEMP Design Plan with the site-wide AEMP Re-evaluation, as discussed in the April 8, 2022 Reasons for Decision.²⁰ As identified by Arctic in the cover letter for the Plan, the Plan is designed to be implemented in conjunction with the site-wide AEMP, amalgamated with the site-side AEMP Design Plan, and reported under that AEMP in the future. The Response Framework would also apply to Point Lake AEMP parameters. No significant concerns were raised with Arctic's approach to the Point Lake AEMP Design Plan, and given the alignment with the existing AEMP, the Board has approved the Point Lake AEMP Design Plan. During the public review, Board staff asked if there were any limitations to combining the Point Lake AEMP Design Plan with the overall AEMP Design Plan in a future submission (WLWB staff comment 6). Arctic responded that there was no limitation, and the Point Lake AEMP Design Plan was drafted to align with the side-wide Plan to allow for future amalgamation. As such, the Board requires that the Point Lake AEMP Design Plan be integrated in submission of Version 8.1 of the site wide AEMP Design Plan.

- ***Decision #7: The Board has approved the Point Lake AEMP Design Plan Version 1.0***
- ***Decision #8: Arctic is to incorporate the Point Lake AEMP Design Plan into Version 8.1 of the AEMP Design Plan.***

During the public review, Board staff noted that section 5.1 of the Point Lake AEMP Design Plan indicates that Point Lake AEMP reporting would be included as part of the annual site-wide AEMP Annual Report, but also that it would be incorporated "for the first year of PLD AEMP monitoring" (WLWB staff comment 7). Board staff asked Arctic to clarify if Point Lake AEMP reporting would be continued beyond the first year. Arctic confirmed that Point Lake AEMP monitoring results would be included in the AEMP Annual Report going forward after the start of Point Lake mining. The Board requires that this be clarified in Version 8.1 of the Design Plan.

- ***Revision #3: Arctic is to revise the text in Version 8.1 of the AEMP Design Plan to clarify that Point Lake AEMP reporting will be included in the annual site-wide AEMP Annual Report starting with the first year of Point Lake AEMP monitoring.***

3.2.1 Sampling Components

In the Point Lake AEMP Design Plan, Arctic proposed the following components be sampled annually at Point Lake-specific AEMP sites: physical limnology and water quality both under-ice and during the open-water season; and phytoplankton during the open water season. Arctic noted that if water quality and phytoplankton were observed to change as a result of mine-related activities associated with Point Lake Development, then the sampling of sediment quality, zooplankton, and benthos communities would be considered for initiation as part of the AEMP Re-evaluation or as part of an Action Level exceedance

²⁰ See WLWB Online Registry for [Ekati – Point Lake Project – RFD and Recommendation to Minister – Apr 08, 22](#)

response. GNWT-ENR commented that the inclusion of a single water quality sample collected during the open water season provides an instantaneous measure of water quality on a single day of the year and may miss potential effects on the aquatic environment (GNWT-ENR comment 3). GNWT-ENR suggested that other metrics to assess the health of the aquatic environment in these lakes should be included in standard AEMP monitoring rather than as a reaction to changes in water quality. GNWT noted sediment, phytoplankton, and benthic invertebrate metrics integrate potential impacts that may be missed by water quality sampling alone and recommended the Point Lake Design Plan include sediment quality and benthic invertebrate metrics, using methods described in the site-wide AEMP (GNWT-ENR comment 3). Board staff also asked Arctic if, given the relatively short project timeframe, using the regularly scheduled AEMP Re-evaluation to determine if other components should be sampled under the AEMP would adequately capture potential changes (WLWB staff comment 8). Arctic responded that it has committed to monitoring physical limnology and water quality during under-ice and open-water, as well as phytoplankton during open water at the proposed Point Lake sampling locations. Arctic noted that the Point Lake AEMP Design Plan was intended to complement monitoring under the Waste Rock and Ore Management Plan, Surveillance Network Program, and/or the site-wide AEMP. Arctic also noted that the screening of AEMP data against the Response Framework would provide an additional mechanism through which the need for additional sampling could be identified. Arctic noted that the monitoring approach to the Point Lake Project is similar to that previously approved and executed for the Pigeon-Fay and Upper Exeter Watershed, where the potential for effects is lower compared with watersheds receiving mine discharge.

In response to GNWT-ENR comment 3, Arctic also explained that the King-Cujo Watershed is the receiving watershed for all mine water from the Point Lake Project; thus, AEMP monitoring in that watershed was not included in the Point Lake-specific Design Plan to avoid duplication with the site-wide AEMP. The Board previously decided that there was uncertainty as to the quality of Point Lake overburden seepage and runoff, and all minewater from the Point Lake Development was to be directed to the KPSF, unless otherwise approved by the Board (see Licence W2020L2-0004, Part H, condition 14).²¹ As all Point Lake Project minewater needs to be collected and sent through the KPSF, the Board agrees with Arctic's rationale that the AEMP monitoring for the King-Cujo Watershed is appropriate for covering monitoring of metrics at sites potentially influenced by Point Lake-related effluent beyond those proposed in the Point Lake AEMP Design Plan. The Board also notes that baseline data was collected for the sediment quality and benthos communities in Point Lake AEMP lakes, so there is data available to compare with in the future should potential impacts in water quality, physical limnology, and/or phytoplankton be identified at the Point Lake-specific sites and the need for further investigation/monitoring of sediment/benthos is required. The Board is thus of the opinion that Arctic's proposed monitoring for mine-related changes through the Response Framework Action Levels and the AEMP Re-evaluation are appropriate mechanisms given the consolidated minewater pathway; therefore, the Board is not requiring changes to the selected sampling components at this time.

²¹ See WLWB Online Registry for [Ekati – Point Lake Project – RFD and Recommendation to Minister – Apr 08 22](#); Pg 40

3.2.2 Timing clarification

ECCC noted that the Plan indicated the need to continue the Point Lake AEMP would be evaluated after three years, or at the end of mining operations, and that it was unclear if Arctic intended for those to be “whichever comes first” statements or if there were still aspects to be determined with respect to specific timing details (ECCC comment 1). Arctic responded that the need to continue the Point Lake AEMP would be re-evaluated as required by the Licence, after the commencement of the program, or as part of the interim Closure and Reclamation Plan in preparation for the end of mining of the Point Lake Open Pit, whichever ever comes first, noting that any changes to the program would be subject to Board approval and implemented as directed by the Board. As Arctic has provided clarification for this timing, the Board is of the opinion it should be reflected in the AEMP Design Plan.

- **Revision #4: Arctic is to revise the text in Version 8.1 of the AEMP Design to reflect anticipated timing for re-evaluation of the program**

3.3 Other Comments

Other comments submitted during the public review are not discussed in this Reasons for Decision because the Board is of the opinion that the responses provided by Arctic adequately addressed the reviewers’ comments or were identified as not requiring a response (e.g., comments from reviewers providing a list of citations to support their comments). These comments include: IEMA comment 5; GNWT comment 1, 7, and 8; ECCC comments 3 and 4; and WLWB staff comments 2 and 4.

Signed the 23rd day of May 2023, on behalf of the Wek’èezhìi Land and Water Board



Mason Mantla
Chair, Wek’èezhìi Land and Water Board



Witness

Table 1. Board Decision on Arctic’s Recommendations Resulting from the 2022 AEMP Re-evaluation Report regarding Version 8.0 of the AEMP Design Plan and the next AEMP Re-evaluation Report:

Number	Arctic’s Recommendation	Board Decision
1	Multivariate analyses are an effective tool to understand patterns in the AEMP data and will continue to be included in future re-evaluations, as needed, with the goal of improving the understanding of newly identified uncertainties in AEMP datasets.	Approved by the Board (see section 3.1.5 of these Reasons for Decision).
2	Consider replacing the Logan Outflow hydrometric monitoring station with a station at HWL4 Outflow, located at 513169 m East, 7193616 m North (NAD 1983 UTM Zone 12N). Any changes to the monitoring location will be reported in a future AEMP annual report.	Approved by the Board. No comments/concerns were raised during the public review
3	Total nitrogen analyses should continue to be completed the 1 cm Ekcore (when enough material is available) and the 2 cm Ekman grab sediment samples when necessary. No change to the AEMP Design Plan is required.	Approved by the Board (see section 3.1.2 of these Reasons for Decision).
4	Exclude non-benthic taxa from the lake and stream benthos datasets.	Approved by the Board (see section 3.1.3 of these Reasons for Decision).
5	The initiation of large-bodied fish sampling as part of the AEMP for the Horseshoe Watershed is not necessary at this time. Results of the next small-bodied program will inform the need to initiate large-bodied fish sampling.	Approved by the Board. No comments/concerns were raised during the public review. IEMA comment 2 indicated support for this recommendation.
6	The recommended list of AEMP evaluated water quality variables for 2023 to 2025 is outlined in Table 4.5-1, which is based on the results of the 2020 and 2021 AEMP analyses, the Koala Watershed water quality model predictions (ERM 2022c) and the Two Rock Settling Pond water quality model predictions (ERM 2021c). Changes includes the removal of total zinc from the list of AEMP evaluated water quality variables for Horseshoe Watershed and Lower Exeter Lake.	Not approved by the Board (see section 3.1.1 of these Reasons for Decision).
7	Review the list of AEMP evaluated water quality variables during the next Re-evaluation to reflect trends, predictions, and any relevant analyses.	Approved by the Board. No comments/concerns were raised during the public review
8	The recommended list of AEMP evaluated sediment quality variables for 2023 to 2025 is outlined in Table	Not approved by the Board (see section 3.1.1 of these Reasons for Decision).

	<p>4.5-2, which is based on the results of the 2021 AEMP analyses and the predictions of the Koala Watershed water quality model (ERM 2022c) and the Two Rock Outfall Design Report, Version 3.0 (ERM 2021c). Changes includes the removal of zinc from the list of AEMP evaluated water quality variables for Horseshoe Watershed and Lower Exeter Lake.</p>	
9	<p>Review the list of AEMP evaluated sediment quality variables during the next AEMP Re-evaluation to reflect trends and any relevant analyses.</p>	<p>Approved by the Board.</p> <p>No comments/concerns were raised during the public review</p>
10	<p>No changes to the baseline period used for sediment quality in the Horseshoe Watershed and Lower Exeter Lake are required.</p>	<p>Approved by the Board.</p> <p>No comments/concerns were raised during the public review</p>

Table 2. Board Decision on Arctic’s Recommendations regarding the Response Framework:

Number	Arctic’s Recommendation	Board Decision
1	Total iron should be added to the ARF water quality variable list.	Approved by the Board. No comments/concerns were raised during the public review
2	Total vanadium should be removed from the ARF water quality variable list.	Approved by the Board. No comments/concerns were raised during the public review.
3	The water quality benchmark for total iron should be the current CCME guideline for the protection of aquatic life which is 0.3 mg/L.	Approved by the Board. No comments/concerns were raised during the public review.
4	<p>In the ARF (Section 5.2.3.1 of the AEMP Design Plan, Version 7.1; ERM 2021a), the following text: If this scenario were to occur, a Response Plan would be developed that would include support of the conclusion of no mine-related effect. In this case further management action beyond continued monitoring and reporting, and the definition of a MAL and HAL would not be required.</p> <p>Should be replaced with: If there is indication that the LAL exceedance is not due to a mine-related effect, Arctic Canadian will identify this in the Exceedance Notification to the Board and follow-up with evidence to support the conclusion of a potential mine-related effect or no mine-related effect within 30 days for Board approval. If the LAL exceedance is determined to be potentially mine-related, a Response Plan would be developed, or updated if necessary. If the LAL is determined to be unrelated to the mine, the development (or update) of a Response Plan and the definition of a MAL and HAL would not be required and the <i>variable would continue to be monitored under the AEMP.</i></p>	Not approved by the Board (see section 3.1.6 of these Reasons for Decision).
5	<p>The LAL for general biological variables should be updated to: A LAL for phytoplankton, zooplankton, or benthos biomass or total density variables is exceeded when the following conditions are met: L1. A mine-related effect is concluded for a near-field site, based on AEMP methods for determining mine-related effects for phytoplankton, zooplankton, and benthos biomass or total density; and</p>	Approved by the Board. No comments/concerns were raised during the public review

	L2. The specified biological variable mean is less than the lower benchmark or greater than the upper benchmark, for the current AEMP year and the previous two years at any near-field site, using the biological benchmarks based on upper and lower quantiles ($p = 0.05$) of the fitted distributions.	
6	The benchmark for chlorophyll <i>a</i> is conservative, based on empirical evidence, and is appropriate for the purpose of screening for potential LAL exceedances for phytoplankton biomass. No change to the chlorophyll <i>a</i> benchmark is required.	Approved by the Board (see section 3.1.3 of these Reasons for Decision).